Passed March 1827
W. E. H.

A Thesis
On
Hydrocephalus Acutus
By
Sidney W. Smith
Of the
District of Columbia

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The disease commonly called hydro-
-cephalus, or water in the brain, and lately
denominated hydrencephalus, has been di
vided into the internal and external: the
water in the former being situated within the
brain, and in the latter between the bone and
its integuments. But this distinction is now
abandoned, and it appears with propriety, as the
latter is considered to be nothing more than
an anasarcous affection.
The common division at present, is into the acute
and chronic, the former of which it is my in-
-tention to treat.
As regards the origin of the disease, there is some
difference of opinion. That the ancients were
acquainted with the chronic hydrocephalus, is
I believe, universally admitted: but it is not cer
tain they had any knowledge of the acute. In-
-deed, it is generally believed, that the latter,

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was not known until the time of Petit, who described it in the year 1718; but a late writer has attempted to show, that is was known long before, for, says he "from a passage of Hippocrates de morb. lib VII Sectio V it is clear that the father of medicine knew the disease, and may have had about it more accurate ideas than many living practical physicians". Be this as it may, the disease appears to have been lost sight of, at least it is not noticed by any writer so far as I know, except Petit, until the time of Dr. Robert Whytt of Edinburgh, who in the year 1768, published a very ingenious treatise on the disease. It is to this great man the medical world is indebted, for the first correct history, of the symptoms, of acute hydrocephalus. Since his time it has attracted no little attention, and various essays have been written on the subject, some of them by the most eminent of the profession,

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among whom may be reckoned Quin, Cheyne, Smyth, Yeats, and our highly distinguished countryman, the late Dr Rush.

The disease is chiefly incident to children, attacking infants even in the first days of their existence, but more frequently, about the period of dentition. Adults are liable to it, particularly females, about the season of puberty; in whom it is said to be brought on by a translation of action from the uterus to the encephalon, by a vicarious assumption of the office of menstruation. It sometimes, though rarely, occurs in advanced life.

Among the numerous causes of the disease, are, the age of childhood, the great disproportionate size of the head to the rest of the body; the softness and vascularity of the brain, producing frequent congestion towards the head: violent agitation of the brain, from falls, blows, and other accidents: standing on the head, or hanging by=

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the feet with the head down, for a long time: violent exertion, violent mental emotions, the too early and frequent use of strong drink, the irritation from dentition, or worms, or sordes, of different kinds; habitual constipation, and other affections of the alimentary canal. It is sometimes a termination of our common autumnal fevers, Cholera infantum and catarhal fever when the mucous tissue of the primæ viæ is involved. So frequently indeed, does it arise from diseases of the abdominal viscera, that the more modern physicians, have considered it as either primary, or secondary, and some have gone so far, as to say, it seldom, if ever, exists as an idiopathic disease. To the causes enumerated may be added, tumours, scirhosities, and ossifications of the brain; the sudden suppressions of eruptions, or discharges of the scalp, and neighbouring parts: particularly of crusta lactea, tinea capitis, &c.

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In its progress, the disease is marked by three stages; first of predisposition, second of excitement, and, third of oppression.

In the stage of predisposition or excitement, the child complains of languor, as if arising from fatigue; the appetite is capricious, and there is occasional thirst: the bowels are torpid, or loose, and the stools unnatural, being white and glutinous, with a mixture of green: the urine is scanty and high coloured: the countenance pale and collapsed, with a dark line under each eye; the tongue furred, the skin harsh; some uneasiness of the head is complained of, which is more a tenderness of the scalp, than positive pain: the abdomen is tumid or rather puffy, with a sense of oppression about the pit of the stomach, and seat of the duodenum, attended by pain on pressure. The child is peevish and fretful, and the sleep disturbed by startings, and general restlessness. This state may continue an

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indefinite length of time, but sooner or later is followed by the phenomena of excitement or phlogosis. The stomach now becomes affected with nausea and vomiting: the bowels constipated; the tongue moist and furred, though sometimes dry and floid: skin hot, and the face flushed. There is acute head ache, or pain and stiffness in the nape of the neck: or rheumatic affections of the joints, or soreness in the hands and feet: throbbing of the temporal arteries: strange sensations, or noises in the ears, as tinnitus aurium, the rushing of wind or the falling of water, or the ringing of bells: much aversion to light and to sounds, dry nostrils, picking of the nose, and occasionally a pretty active, and irregular pulse. The fever is remittent, abating in the morning, with the exacerbation at night. Continuing in this way for a few days, there will be discovered with less general excitement, the approach of heaviness, attended by a knitting of the brows,=

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and a scowling expression of countenance. The pupil of one or both eyes is dilated or contracted, the pulse becomes slower, and sometimes intermits: the bowels unrelentingly constipated, or occasionally disordered, the stools being watery, or of a gelatinous consistence and clay-coloured, mixed with green scybala: the whole surface covered with an oily slime. The urine is still more deficient. Though, for a time, the sleep seems to be profound, it is still interrupted by frequent moanings, and startings, and grinding of the teeth. When aroused, there is at the moment, partial delirium, manifested by a wild, distracted eye, incoherent mutterings, unusual behaviour, or quite irrational conduct. Sometimes a dry teazing cough now comes on This state of things advances on to the state of oppression, owing probably to effusion having taken place. The pulse gradually becomes weaker, smaller, and more accelerated, till it

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There is squinting, more widely dilated or contracted pupils, rolling of the head, automatic or unmeaning tossing of the hands, low delirium, spasms or convulsions, usually of one arm or leg, or of the muscles of the face.
No inconsiderable difficulty of deglutition also exists, and the respiration is frequent and laborious, with a lengthened pause between each expiration, and not unfrequently involuntary alvine and urinary discharges, the latter copious, and mostly pellucid.
In this insensible condition the child will lie for days, exhibiting an afflicting spectable.
Emaciated considerably, in some instances, its aspect is still more altered by the effects of its sufferings. The face is pale, the eyes are sunken, though half open with a film on the surface, the temples are hollow, the

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nose contracted, the forehead glazed, or moisten=
=ed by a cold, dewy perspiration. Death usually
takes place, in some convulsive struggle.
As described, such is the course of the disease as
it usually occurs. But it is infinitely diversi=
fied, both in its approach and duration,
sometimes it comes on without any premonition,
and terminates fatally in a few days.
Children of a strumous diathesis, are peculiar
ly liable to the disease. "It chiefly falls", says
Dr. Cheyne "upon the children of families
having a strumous taint; at least upon chil
dren having those peculiarities of skin, complex
ion, and features which indicate scrofula; and
sometimes it attaches itself to particular fam=
=ilies. I have attended two families, in one of
which four children, in the other three, died
of this disease; and I have heard of an unfortu=
=nate father who lost eleven children of hydrocephalus

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It comes on under such circumstances more slowly, and generally is so vaguely characterized as not to be suspected. The child is irritable and fretful; has perturbed sleep, dry husky skin, vitiated appetite, imperfect digestion, furred tongue, torpid or relaxed bowels, with offensive, clay or slate-coloured stools; deficient and loaded, or clear and abundant urine; turnid abdomen, with much general wasting and attenuation of frame and loss of muscular power, especially of the lower extremeties. A slow, irritative fever, now arises, with an expression of cerebral suffering; the child becomes attached to a recumbent posture, and may be seen to roll its head from side to side, toss its arms in various directions, and is much disquieted. There is now a rapid developement of the phenomena of the disease, and all doubt as to its nature is removed.

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The duration of the disease is various. It most frequently terminates about the third week: but in some instances, it is extended even to months, and in other cases, it terminates as before mentioned, in a few days.

Examinations after death, show the existence of phlogosis more or less intense, of the brain and its membranes. Dr Cheyne says "upon dissection, we generally find within the cranium, the veins, particularly those of the membranes on the surface of the brain and lining of the ventricles, gorged with dark coloured blood; sometimes considerable adhesion between and thickening of the membranes, and minute and fluid vessels upon the pia mater. The ventricles we find to contain from two to six ounces of limpid serum; also fluid in a small quantity under the tunica arachnoides, both above and at the base of the brain. The substance of the brain is generally

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soft and blanched, imbibated and particularly soft where it forms the ventricles. The substance of the fornix is often like a soft curd. In the abdomen, I have found the intestines inflamed and constricted from spasm, and the surface of the liver of a bright red colour, abounding in minute vessels; and sometimes extensively adhering to the peritoneum.

Dr. Quin speaks of the vascular turgescence of the brains on dissection, and says, that "in most of them a degree of inflammation had taken place, as appeared at the time of dissection, either by preternatural adhesions of the membranes or by a partial opacity, and increased thickness of them, together with patches of inflammatory crust, very similar to those which are found on the abdominal viscera of persons whose death has been the consequence of enteritis, or on the lungs and pleura of those who have sunk

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Such are the appearances commonly presented on dissection. Cases, however, are recorded, in which no vestige of diseased action could be de=tected in the brain; there being neither effusion, congestion, or inflammation.

The fluid varies in quantity, from two, to six, or eight ounces: and, according to Dr. Smyth, "resem=bles the purest water, being perfectly transpa=rent and colourless, neither coagulating by heat, nor from the admixture of mineral acids. When exposed for some time to the heat of boil=ing water, it evaporates to dryness, leaving hardly any residuum".

Dr. Bailey says, "The water is of a purer colour, and more limpid than what is found in dropsy of the thorax or abdomen. It appears, however, to be of the same nature with the water that is accumulated in both of those large cavities.

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In some trials which I have made, it coagulated upon the application of the common acids exactly like the water in hydrothorax and ascites, or like the serum of the blood. But there is much variety in the quantity of the coagulable matter. In some instances the water in hydrocephalus contains a very small proportion of coagulable matter, and in others it is almost entirely free from it".

Respecting the nature of the disease, physicians have entertained very different opinions. By Dr. Cullen it was considered as a species of apoplexy depending on pressure on the brain from water.

Duin says, that, it "owes its origin to a morbid accumulation of the blood in the vessels of the brain, sometimes proceeding to a degree of inflammation, and generally but not always, producing, an extravasation of=

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Dr. Cheyne says "it requires but a very limited knowledge of pathology to render it obvious that this disease is not a dropsy (as supposed by Dr. Fothergill) produced by a ruptured lymphatic: or by any original weakness or laxity of the brain, whereby the small exhalent arteries will throw out the lymph faster than the absorbent vessels can imbibe it; or by a too thin or watery state of the blood; suppositions of Dr. Whytt".

After objecting to Dr. Quin's opinion: Dr. Cheyne goes on to say, "I would venture to submit the following as a more consistent view of the pathology of hydrocephalus. That, in this disease, there is produced a venous congestion, in addition to, and probably arising from, the increased arterial action: that the effusion of serous fluid arises from this venous congestion: that this effusion has a tendency to counteract

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the baleful effects of the increased action, and to retard the fatal termination of the disease; of course, that the effusion into the ventricles is not the cause of the violent symptoms; and that the increased arterial action, though perhaps varied, does not cease when the congestion and effusion have taken place".

Dr Rush, considers the disease as inflammatory; and calls it Phrenicula, from its being a diminished state of phrenitis. "No more occurs", he says, "in this disease than takes place when hydrothorax follows an inflammation of the lungs, or when serous effusions follow an inflammation of the joints".

Dr Yeats says, that, an accumulation of fluid from hydrocephalus, is coagulable by the application of acids. "It is evident then", he continues, "that this morbid effusion is caused by an action of the vessels, different from

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=tion of fluid, which is not coagulable, and
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but alters the qualities of the effused fluid."
The diagnosis in this disease is sometimes ex=
=tremely difficult. It is most apt to be con=
=founded with low fevers, and those proceeding
from worms, and depraved conditions of the
bowels. The symptoms to be attended to as
chiefly distinctive of hydrocephalus, are, the in=
=clination to vomit, the constipation, or the as=
=pect of the stools when procured, the state of the
urinary discharge, the aversion to light, the
noises in the ears, the state of the pupils, the
strabismus, the slow irregular pulse, the roll=
=ing of the head, the tossing of the hands, the
coma, the impeded deglutition, the short
interrupted respiration, and the inability
to bear any other than the recumbent posture.

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The prognosis is always doubtful, and generally unfavourable, unless, the disease be detected at an early period. After effusion has once taken place it is almost universally fatal.

Dr Whytt considered it hopeless, under all circumstances. He says," I freely own that I have never been so lucky as to cure one patient who had those symptoms which with certainty denote this disease". Drs Cheyne and Yeats, however, do not speak in such discouraging terms; and Dr Rush, thought it quite a curable disease.

When excited by irritation of the abdominal viscera, it is much more manageable than when originally seated in the brain. Occuring in children, of a sound, and robust constitution, it is less dangerous, than in those who are originally of feeble habits, or emaciated by disease.

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The most unfavourable signs are great disin=clination to be raised, with an inability to sit up, from giddiness and confusion of head, and par=ticularly when attended with tinnitus aurium, or other sounds, or by deafness; dilatation or contraction of the pupil, squinting, and pain in the neck or head. Coma, convulsions, blind=ness &c. Copious discharges of pellucid urine are thought by some to be favourable, while others consider it a mortal sign

The treatment, of the disease, in its commence=ment, consists, in evacuating the alimentary canal by Emetics, or purgatives; the latter, how=ever, are generally preferred. These, aided by rest, low diet, and a strict adherence to the antiphlo=gistic plan in other respects, will be sufficient to the arrestation of the disease.

These measures, however, failing, or the case having run on to the stage of excitement, a

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more energetic and decisive practice is demanded. Here, blood-letting has been strenuously recommended, and particularly by Dr. Rush: who placed unlimited confidence in it.

Dr. Cheyne admits of general bleeding, but seems, rather inclined, to trust to a topical evacuation of blood. He says "in most cases local bleeding by leeches or cups, or general blood-letting according to the strength of the pulse and state of the patient, must be had recourse to". He adds, however, "I am convinced that blood-letting unless in very robust constitutions is not to be repeated without great danger."

Dr. Yeats directs blood-letting, both topically and generally. Dr. Smyth on the contrary, seems to place little, or no confidence in it.

Comparing all the evidence I have been able to collect on this subject, it appears that, the majority of practitioners, are opposed to

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the employment of general bleeding: and trust to the topical evacuation of blood, by leeches, and cups, or the opening of the temporal artery: except, where the constitution is robust, and the attack violent.

On the propriety of purging, there is less diversity of opinion. No one, indeed, denies its great efficacy: and by some, it is thought to be sufficient in itself, to arrest the disease. Dr. Yeats speaks in the highest terms of purging, and Dr. Cheyne says, "in perhaps every instance, upon the first appearance of symptoms of hydrocephalus, it will be safe to use some strongly cathartic medicine; and it will be proper to repeat this as circumstances require. But, should we ascertain that the alimentary canal is torpid, and imperfectly performing its functions, admitting an accumulation of feculent matter, or that the-

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secretions flowing into it are vitiated or diminished in quantity, which we discover by the peculiarity in the appearance, or the pungent fetor of the stools, we must, by steadily pursuing the purgative plan, endea=
=vour to effect a change; for, while this is pro=
=duced in the appearance of the stools, by the stimulating quality of our medicines, we are effecting a most important change in the hepatic system, alimentary canal, and all the parts, including every organ essential to life, which is connected with them".

Purgatives are recommended by Dr. Rush; he says, "I have constantly observed all the patients whose cases have been related to be relieved by plentiful and repeated evacuations from the bowels".

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not wanting, strong evidence in their favour. We are told by Professor Chapman, that, "an irritated or oppressed stomach, I have seen excite the symptoms of the strongest marked cases of the disease, and which were speedily removed by puking". This he says "is suffi=
=ciently intelligible. But the same sort of affection will occur, and of unquestionable gastric origin; though there may be nothing in the contents of the stomach, to which it can be traced. Even under such circumstan=
=ces, vomiting occasionally proves useful, probably in the same way that it relieves some other cephalic complaints".

Blisters are entitled to a high rank, among the remedies in this disease. Dr Cheyne says, "they are to be employed with the view of producing irritation in the neighbourhood of the diseased organ, With this view,=

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large blisters round the head, to the fore=
=head, occiput and sides of the head, should
be applied in succession, and the surfaces
dressed with strong mercurial ointment."
"Blisters", Dr. Rush says, "have been uniform=
=ly recommended by all practical writers on
the disease. I have applied them to the
head, neck, and temples, and generally
with obvious relief to the pain in the head.
They should be omitted in no stage of the
disease; for even in its inflammatory stage,
the discharge they occasion from the vessels
of the head, greatly overbalances their
stimulating effects upon the whole system."
On the subject of Blisters, Dr. Yeats says, "I
am persuaded, it is a matter of nice descrim=
=ination to apply them; I would not there=
=fore appear to sanction their application
by indiscriminate recommendation; it may,=

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however, be stated, that full evacuations should be premised before they are had recourse to". We are directed by Dr. Chapman, to apply them, first, to the nape of the neck, and subsequently, to the cranium, of a sufficient size to embrace the whole of it from the ear upwards, to remain on for twenty-four or thirty-six hours, or till suppuration of the scalp is induced.

In aid of the above, the application of cold to the head, may be resorted to with advantage. Dr. Rush says, "linen cloths, wetted with cold vinegar, or water, and applied to the forehead, contribute very much to relieve the pain in the head. In a particular case, a solution of ice in the vinegar appeared to afford the most obvious relief of this distressing symptom".

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disease in its early stages. After effusion has once taken place, the only remedy that seems deserving of confidence, is mercury. This medicine was first employed in the treatment of this disease, by Dr. Dobson of Liverpool, and nearly about the same time, by Dr. Percival of Manchester. The experience of these physicians, is decidedly in its favour; and numerous cases are recorded, in the various periodical publications, in which it was employed with the happiest effects.

Dr. Cheyne is one among the many, who speak favourably of the practice. He says; "when the existence of the disease becomes probable, there ought to be no other delay than that occasioned by our endeavours to subdue the disorder in the bowels, in commencing the mercurial course, which, it must be allowed has cured hydrocephalus, even when far advanced."

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Dr. Yeats says, "together with the judiciously repeated application of bleeding and blistering, a diligent use, both internally and externally, must be made of mercury, which, when the constitution is influenced by it, powerfully assists with the other means used, in altering that morbid excitement constituting the disease".

To what has already been said, I will only add the testimony of Dr. Chapman. He says, "by the common consent of practitioners, it seems now to be conceded, that no plan of treatment holds out such prospects of success. Even where effusion has not taken place, it is serviceable by changing the action of the vessels, and diverting the complaint from the head. But, if water exist, it is the only remedy entitled to the slightest confidence. To be effectual under such circumstances, mercury

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must be applied in a bold and decisive man=
=ner. It should be exhibited in as large a
quantity as the stomach and bowels will bear,
and externally applied in the shape of fric=
=tions, with the strongest ointment, most
diligently and copiously. To do less than
this, in these desperate cases, is to trifle with
the remedy, and to cut off the only chance
which the patient has of escape".
In the second form of the disease, the treat
ment is somewhat different. Here, moderate
purging in the beginning, and afterwards
mercury, is mainly to be relied on. General
bleeding in these cases is seldom admissible:
but topical bleeding may sometimes be used
with advantage, and blisters to the head may
be of service. On the whole little can be
expected under these circumstances: the dis=
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After the declination of the disease, nothing more is required to restore the strength of the system, than a moderately nourishing diet; little assistance is required from art, and if there be any strength left, the system, hardly ever fails, to act with vigour.

In order to the prevention of hydrocephalus, the exciting causes must be avoided. The state of the bowels are to be attended to, and any tendency to costiveness obviated by the use of mild cathartic medicines.

Regular and moderate exercise; the use of the cold bath, and regularity in diet, are useful, and should be particularly attended to by those who are constitutionally predisposed to the disease.

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